# Image Tutorial: Pipes and Planks

This tutorial describes showing protein helices as "pipes" (cylinders) and strands as "planks" (rectangular boxes) with **PipesAndPlanks**, and adjusting the lighting to decrease contrast. See also: **Axes/Planes/Centroids**, presets, tips on preparing images

Start Chimera and show the **Command Line** (for example, with **Favorites... Command Line**). Fetch Protein Data Bank entry 2mnr:

> *Command*: **open** **2mnr**

The structure is the enzyme mandelate racemase, containing an N-terminal α+β domain and a C-terminal β/α-barrel domain. Move and scale the structure as desired throughout the tutorial.

The window can be resized by dragging its lower right corner with the mouse or by using a command, for example:
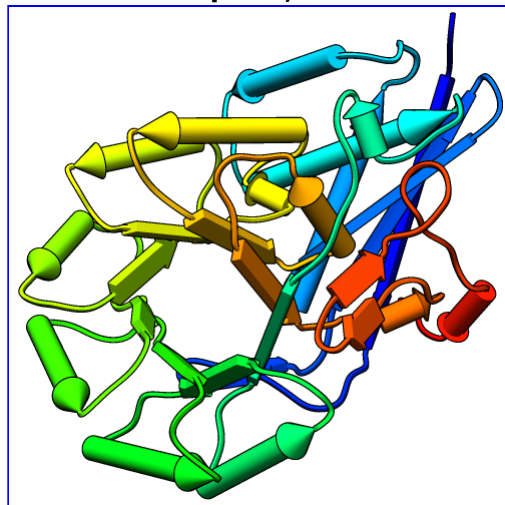
**default: two-point, contrast 0.83**

> *Command*: **windowsize** 500 500

Rainbow-color-code the protein chain from blue at the N-terminus to red at the C-terminus:

> *Command*: **rainbow**

Start **PipesAndPlanks** (under **Tools... Depiction** in the menu), and click **Apply** to generate the pipes-and-planks representation with default settings. **Helix color**, **Strand color**, and **Coil color** settings of "No color" indicate that each pipe, plank, and stretch of coil should be colored using the ribbon color of its first residue.

The pipes-and-planks representation is shown in addition to the ribbon, rather than replacing it. Hide the ribbon and atoms:

> *Command*: **~ribbon**
> *Command*: **~disp**

Apply publication preset 1, which sets the background to white and turns on black outlines (silhouette edges):

> *Command*: **preset** **apply pub 1**

The first example image was saved with the current settings, including default lighting.

## Decreasing the Contrast
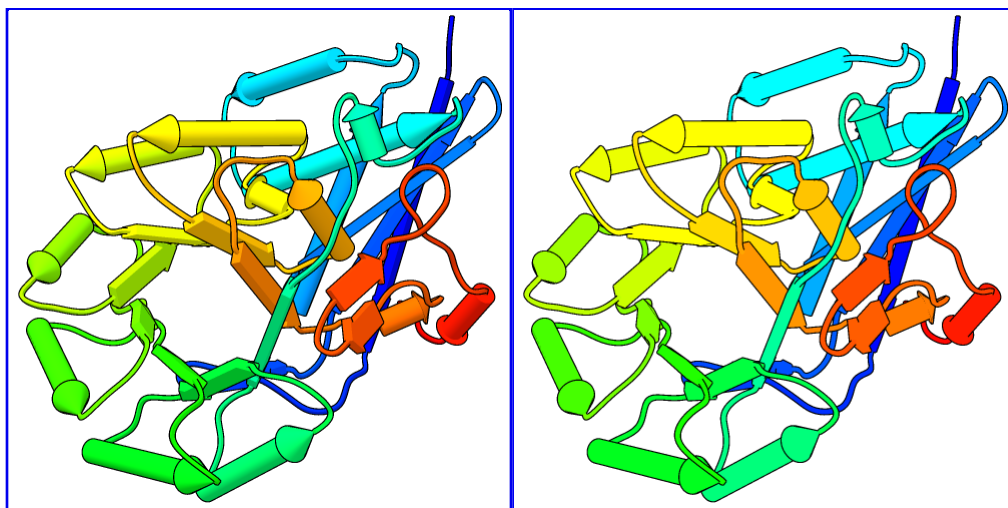
While shading can enhance the perception of depth, shapes, and

**two-point, contrast 0.4**                    **ambient-only**

orientations, it can also make colors muddy and images harder to interpret. One way to lighten the shading is to decrease the contrast, for example:

> *Command*: **light** contrast 0.4

The default lighting mode, **two-point**, includes two directional lights and ambient (nondirectional) light. Decreasing the contrast increases the ambient light and gives a flatter appearance.

A yet flatter appearance, similar to a line drawing, can be achieved by changing the lighting mode to ambient-only:

> *Command*: **light** mode ambient

The lighting mode and contrast can also be adjusted in the **Lighting** tool (under **Tools... Viewing Controls** in the menu), along with other related settings.

## Additional Outlines

In the ambient-only lighting mode, some of the object contours are lost. However, more black outlines can be added using **edge color** settings in the **PipesAndPlanks** dialog. The last example image was saved in the ambient-only lighting mode after setting the **Helix edge color** and **Strand edge color** to black, but leaving the **Coil edge color** as "No color."

A color setting can be changed by clicking the square color well and using the resulting **Color Editor**. The current color can be changed by moving the sliders or by entering a color name (for example, **black**) in the **Color name** field. The active color well should change concurrently, but drag-and-drop from the **Color Editor** to a color well or between two color wells will also work.

**ambient-only, more outlines**

Click **Apply** in the **PipesAndPlanks** dialog to apply your changes. The edges may look quite fuzzy in the Chimera window, but image supersampling (on by default) will make them smoother in saved images. All images in this tutorial were saved using **File... Save Image** with default settings.

Try other changes if you wish; adjustable settings include pipe radius, plank width, and whether to show helix and strand N→C directionality with arrowheads.

*meng-at-cgl.ucsf.edu / June 2012*